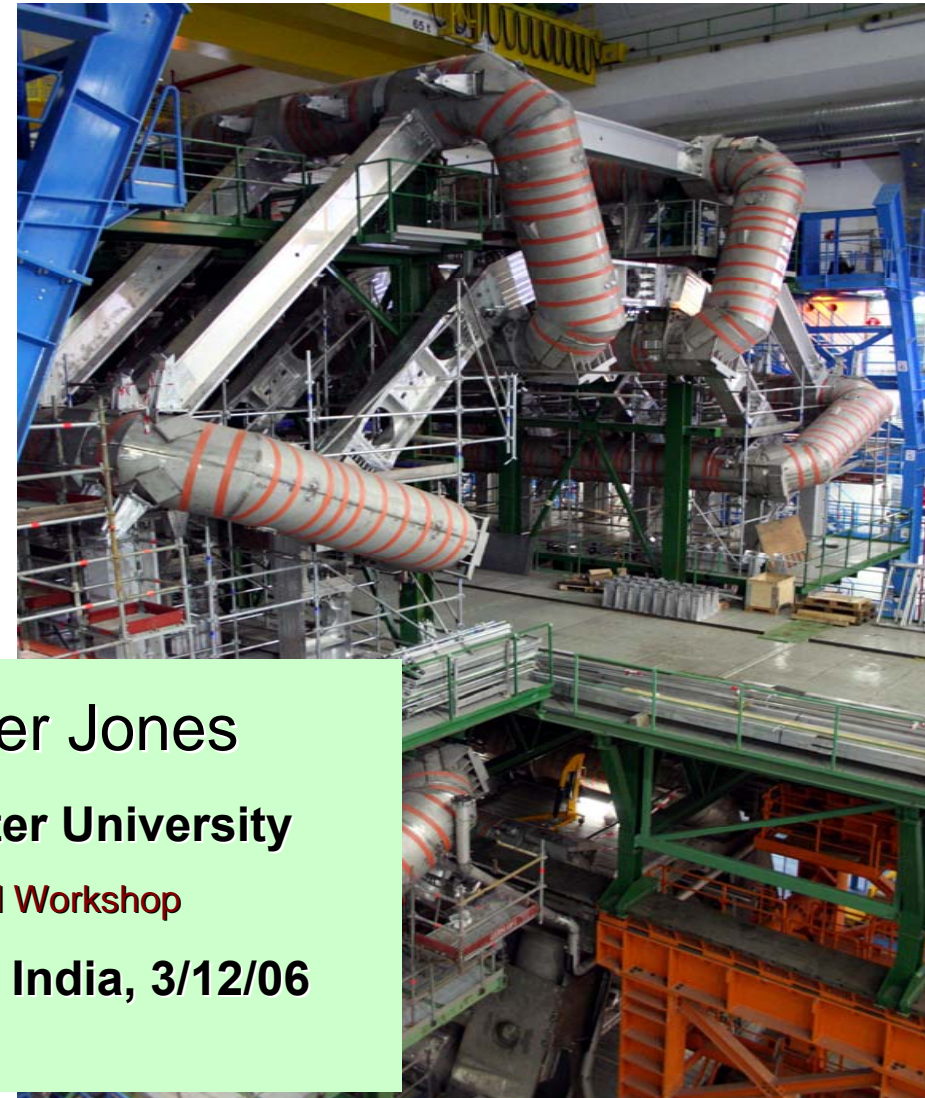
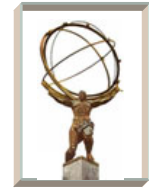


# The ATLAS Tutorial



**Roger Jones**  
**Lancaster University**  
**Grid Workshop**  
**Mumbai, India, 3/12/06**

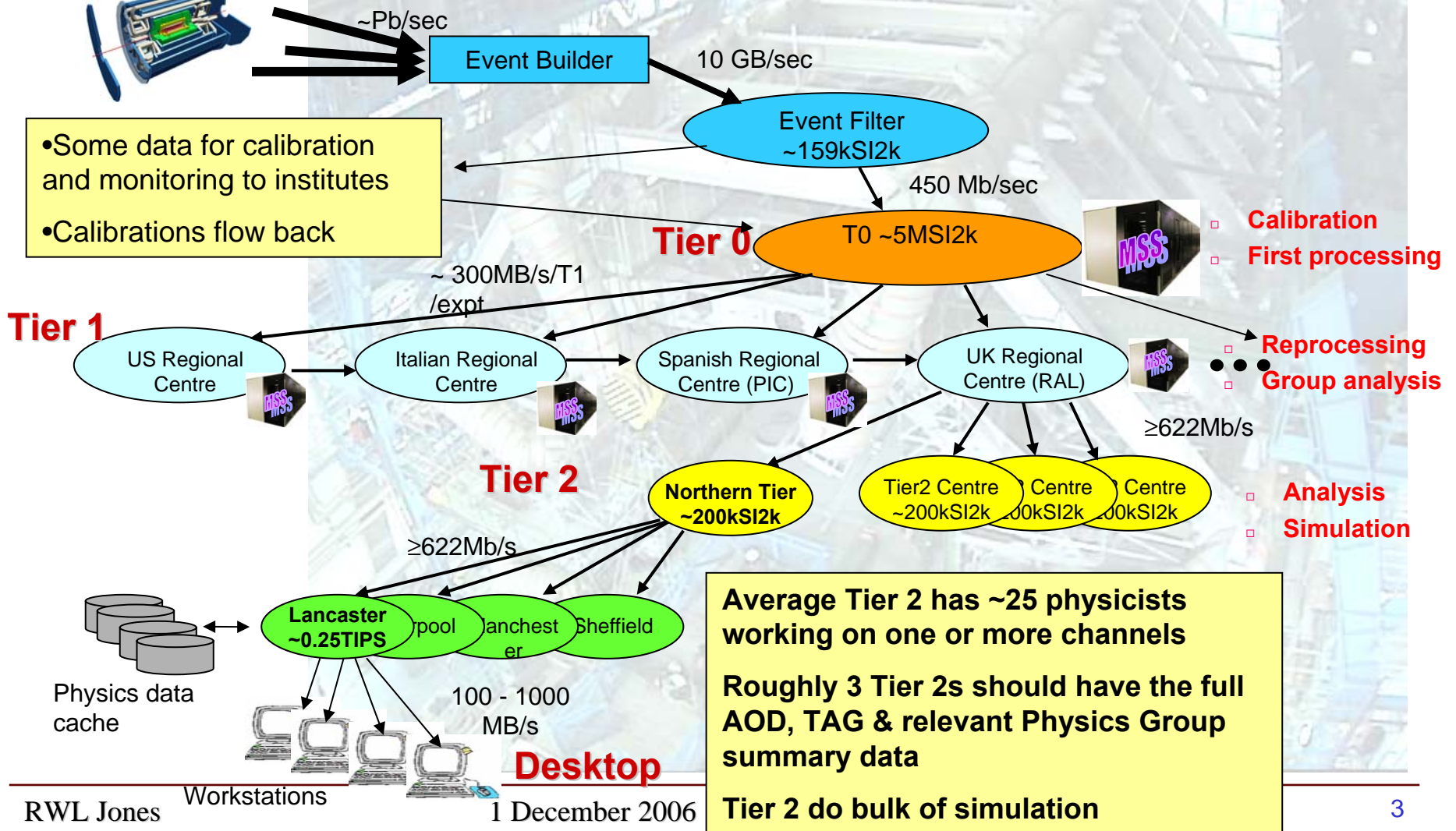
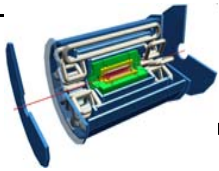


# Overview



- **Brief recap of model & Tier 2 role**
- **Some comments on data operations**
- **Some comments on production operations**
- **Some comments on analysis/user support**

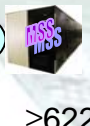
# The Computing Model



•Some data for calibration and monitoring to institutes  
•Calibrations flow back



Calibration  
First processing



Reprocessing  
Group analysis

≥622Mb/s

Analysis  
Simulation

**Average Tier 2 has ~25 physicists working on one or more channels**

**Roughly 3 Tier 2s should have the full AOD, TAG & relevant Physics Group summary data**

**Tier 2 do bulk of simulation**



# Facilities Away from CERN



- **Tier-1:**
  - Reprocess 1-2 months after arrival with better calibrations
  - Reprocess all resident RAW at year end with improved calibration and software
    - Implies large data movement from T1↔T1 and T1 → T2
- **~30 Tier 2 Centers distributed worldwide** Monte Carlo Simulation, producing ESD, AOD, ESD, AOD → Tier 1 centers
  - On demand user physics analysis of shared datasets
  - Limited access to ESD and RAW data sets
  - Simulation
    - Implies ESD, AOD, ESD, AOD → Tier 1 centers
- **Tier 3 Centers distributed worldwide**
  - Physics analysis
  - Data private and local - summary datasets

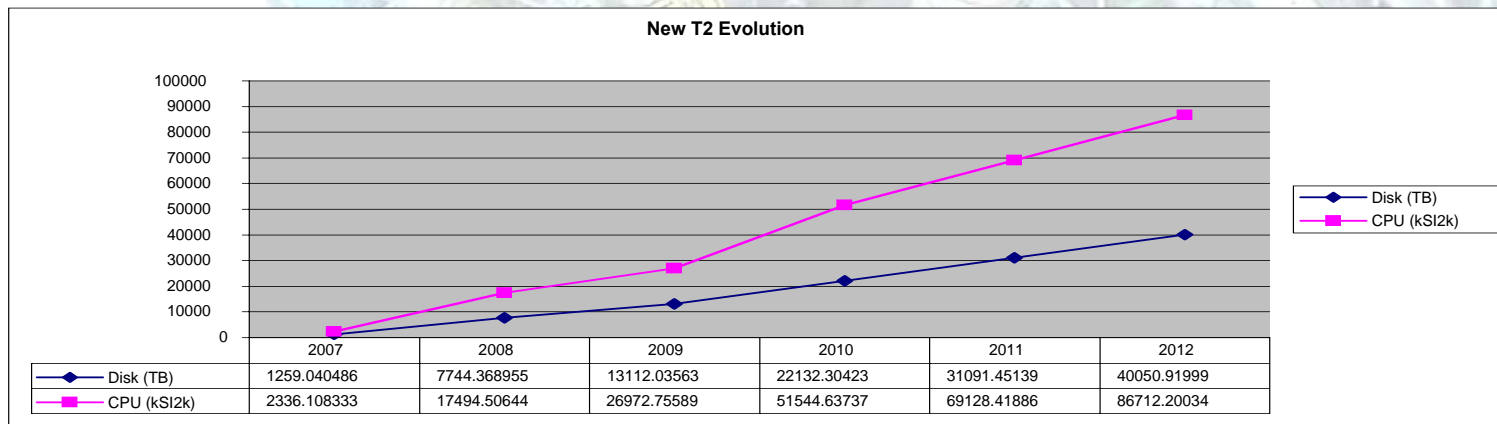


# Evolution



- **The projected T2 evolution is challenging**

- Even with the new schedule, there are shortfalls in 2009 and 2010
- The balance between disk and cpu needs changing
- The T2 role is mainly analysis, and analysis needs data





# T1/T2 Group

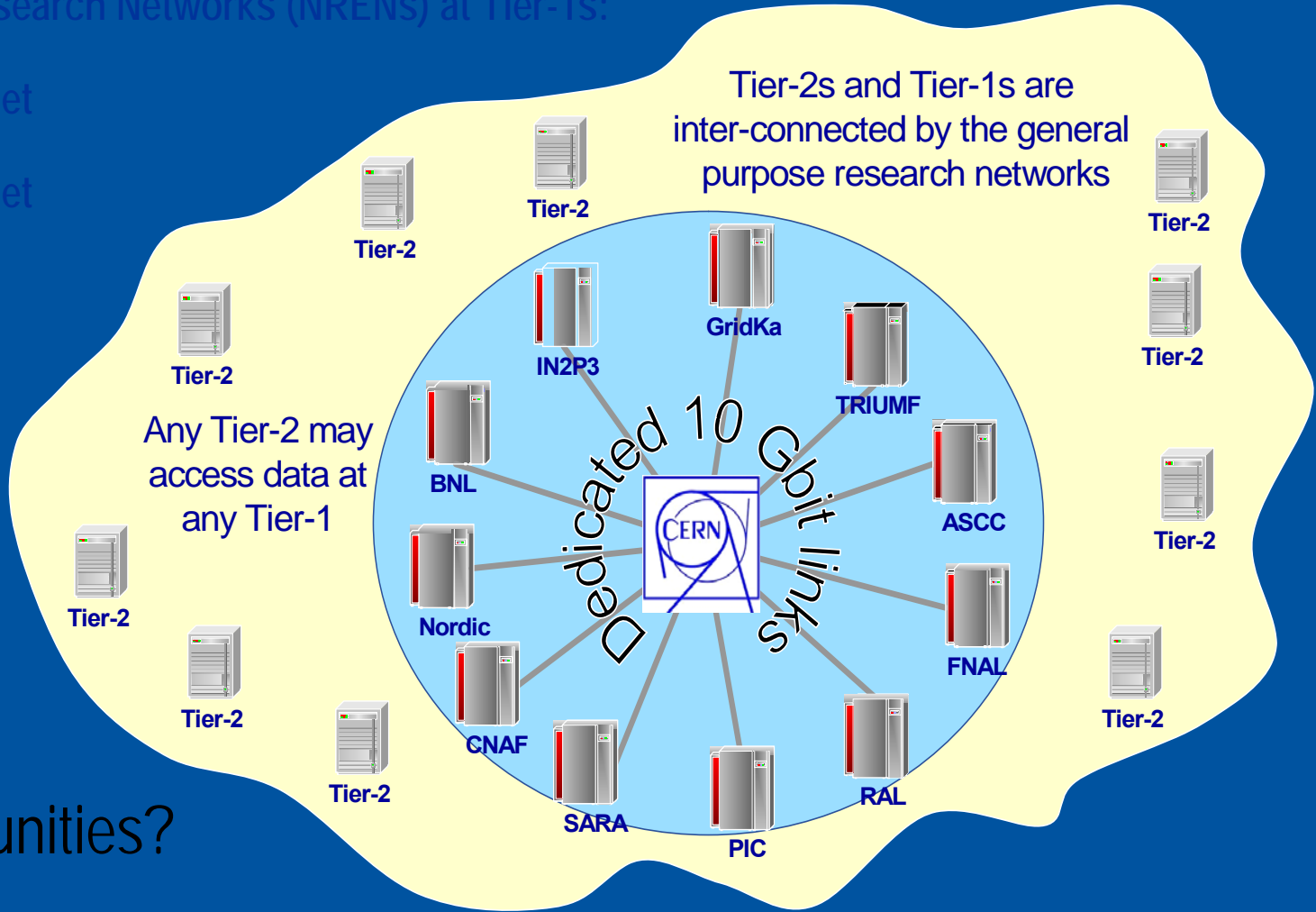
- This has been trying to describe:
  - Network traffic to T1s and T2s at each specific site
  - Required T2 storage at associated T1s
- **Note: this is evolving**
  - The new schedule is included
  - We also know that some pledges will change
  - The sharing of the Tier 1 load is still under discussion (but the one in the current megatable will change)
- **For the sites in the AP region requesting a role for Lyon**
  - Lyon serves the analysis data
  - Taipei stores the simulated data from the T2



# Tier-0 -1 -2 Connectivity

Research Networks (NRENs) at Tier-1s:

- ASnet
- LHCnet/ESnet
- GARR
- LHCnet/ESnet
- RENATER
- DFN
- SURFnet6
- NORDUnet
- RedIRIS
- UKERNA
- CANARIE



## Opportunities?



# Data Location

- **The model assumes that most data is placed**
- **Jobs go to the data, not data to the jobs**
  - Tier 2 capacity is collective, although some regional specialisation for calibration, some physics groups
- **On average, 3 nearby Tier 2s hold the full AOD**
  - There should be very little long-distance T2-T2 traffic
- **Over half of the RAW and ESD in the Tier 2s (and on disk at the Tier 1) should be pre-decided**
  - The rest should be requested via production manager of physics/detector group
  - Tape access will be carefully controlled and optimised
  - Data from disk in a few hours, data from tape in ~ 1 week





# Analysis computing model



## Analysis model broken into two components

- Scheduled central production of augmented AOD, tuples & TAG collections from ESD
  - Derived files moved to other T1s and to T2s
- Chaotic user analysis of augmented AOD streams, tuples, new selections etc and individual user simulation and CPU-bound tasks matching the official MC production
  - Modest job traffic between T2s



# Key Requirements

- **Good relationship with Tier 1(s)**
  - Rapid response
  - Help in both directions
  - VO box at Tier 1 total to your operations
- **DDM operations needs local day-by-day operational support**
- **Production operations needs effort from community**
- **Analysis support not properly evolved, but will need a similar structure**
- **In each case, split between 'Tier' responsibility and 'ATLAS community' responsibility needs defining**
  - The balance may change with region and site



## DQ2: ATLAS Distributed Management system

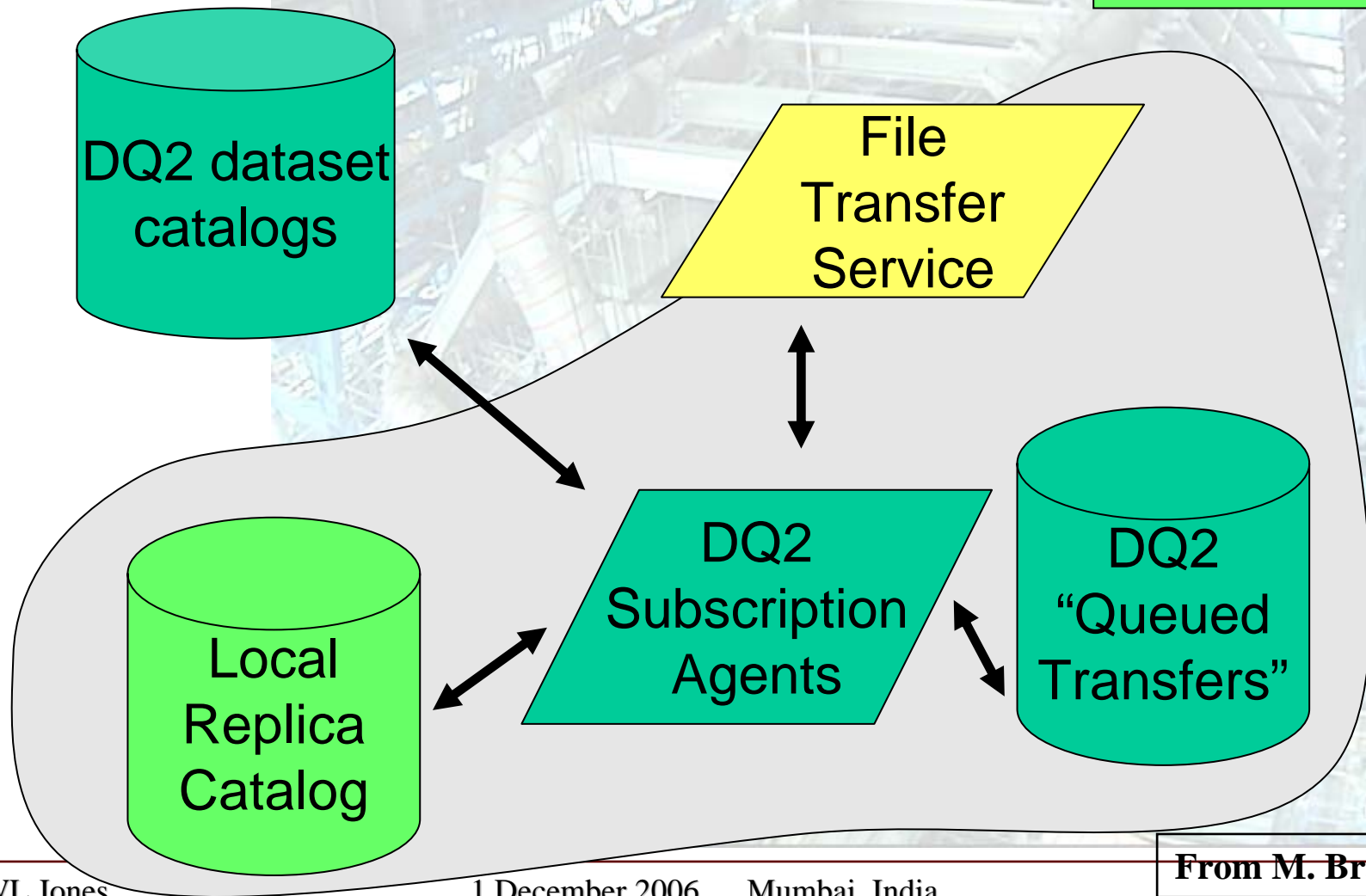


- **DQ2, is built on top of Grid data transfer tools, is based on:**
  - Hierarchical definition of files and datasets
    - Through dataset catalogs
  - Datasets as the unit of file storage and replication
    - Supporting dataset versions
  - Distributed file catalogues at each site
  - Automatic data transfer mechanisms using distributed site services
    - Dataset subscription system
- **DQ2 allows the implementation of the basic ATLAS Computing Model needs:**
  - Distribution of raw and reconstructed data from CERN to the Tier-1s
  - Distribution of AODs (Analysis Object Data) to Tier-2 centres for analysis
  - Storage of simulated data (produced by Tier-2s) at Tier-1 centres for further distribution and/or processing



# DQ2 components

Part of DQ2
Not Part of DQ2
Not Part of DQ2



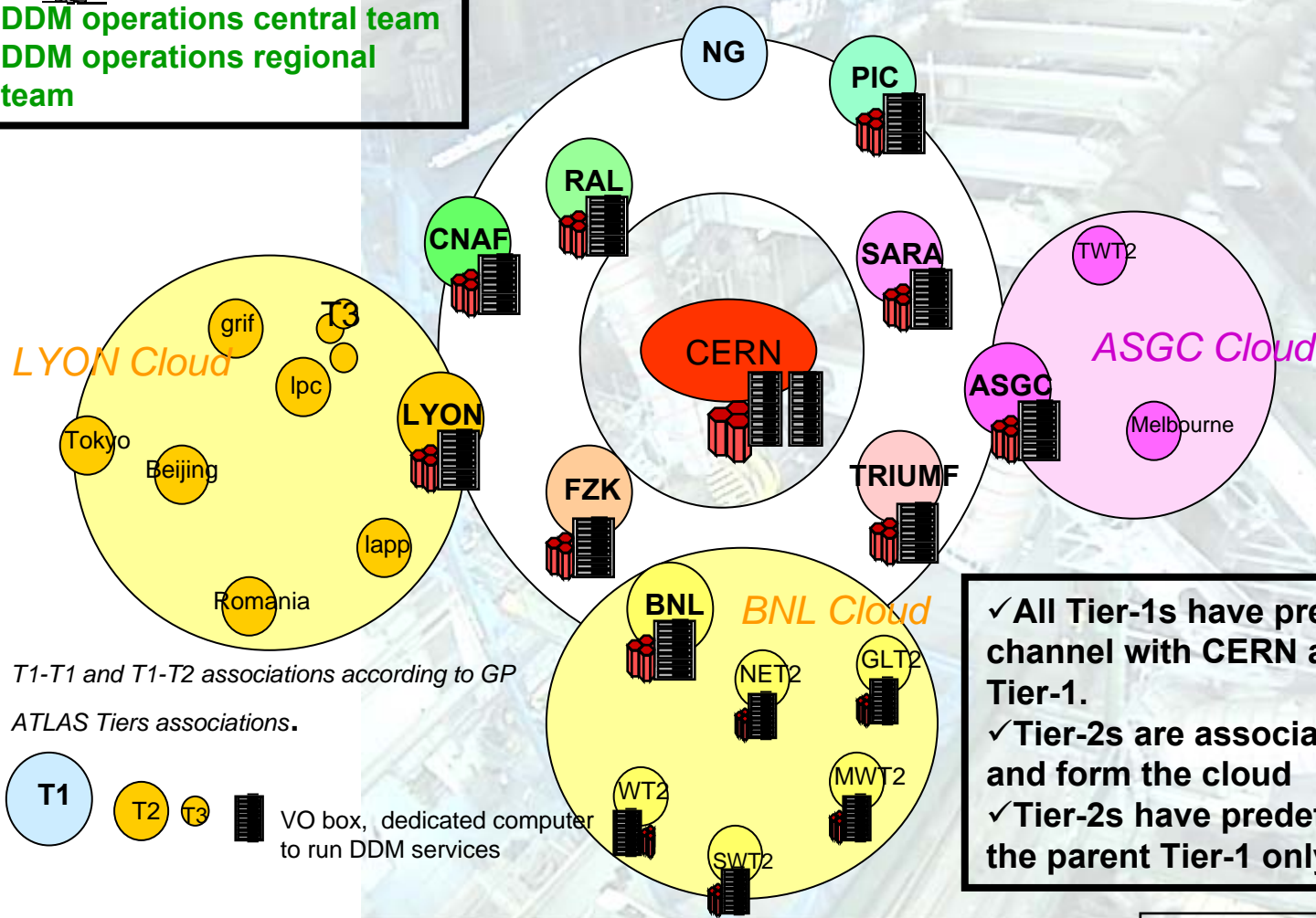
# ATLAS DDM Deployment and Operations Model

UX15 Jura Tue Oct 11 21:00:05 2005



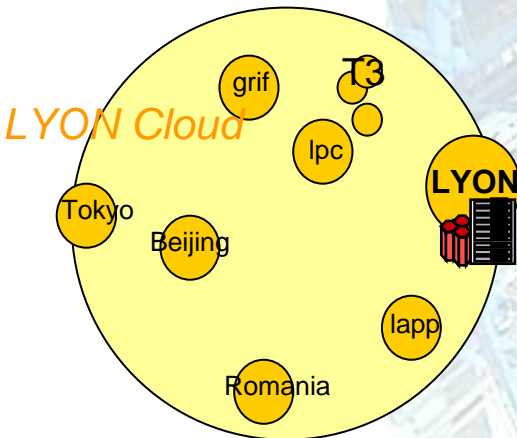
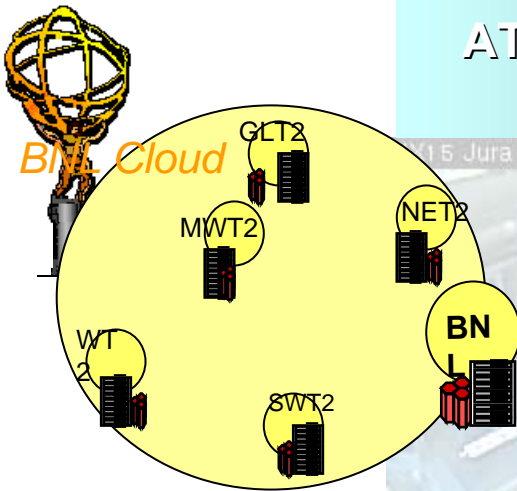
**Operations:**  
DDM operations central team  
DDM operations regional team

## “Tier Cloud Model”



- ✓ All Tier-1s have predefined (software) channel with CERN and with each other Tier-1.
- ✓ Tier-2s are associated with one Tier-1 and form the cloud
- ✓ Tier-2s have predefined channel with the parent Tier-1 only.

# ATLAS DDM Deployment and Operations Model



15 Jura Tue Oct 11 21:00:05 2005

## DDM services on sites

CERN : Central services and central DB

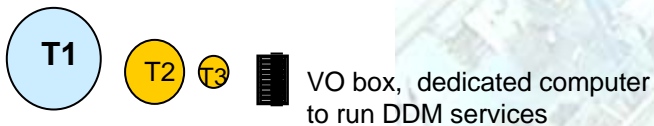
T1Cloud :  
 dedicated machine (VO box) ,  
 site services DB  
 local file catalog (LFC)  
 (one instance per cloud)

BNLCloud : all sites (Tier-1 and Tier-2) have VO box  
 and local file catalog (LRC)

NGCloud : DDM not deployed, yet

T1-T1 and T1-T2 associations according to GP

ATLAS Tiers associations.



• Operation needs about 1 FTE/day in each cloud



# Human Resources



- **There should be T1 coverage at all times**
  - This may be 'on call' and the monitoring of services covered from another time zone in a reciprocal arrangement
- **The T2 coverage should be daily, ideally 2 shifts**
  - Regular contact with Alexi and with the Operations Team
  - The ATLAS-specific part will be part of the OSTMoU service task credit



# Production Operations

- **We need a similar structure for production operations**
  - The T1 role will be (mainly) reprocessing
  - The T2 will be simulation
- **Operations co-ordinator will be announced in 10 days (software week)**
  - There is a need to monitor the regional activity and also to contribute to the central processing team
- **Again, about 1 FTE required in each region**





# User Support

- **This area certainly needs more clarity**
  - Discussions needed between operations manager and the SIT over responsibilities
- **There are EGEE/wLCG reporting structures for Grid problems**
  - Their model is user→GOC→Experiment→user
  - But most user problems are likely to be in the applications layer
  - Seems like user→Experiment→GOC→user is a more natural hierarchy
    - Within experiment, would expect T2→experiment
    - Check if it is a local installation issue
    - Check if it is an ATLAS software problem or data management problem
    - Hand over if it is a Grid problem



## User Support (2)

- **UK trying to operate with 1 FTE split between 2 people**
  - May be better to have people at each site, but need co-ordination (and probably more effort in total)
  - Should also contribute to the central support team (which should be credited)
    - Presently, the SIT should organise this
- **The UK has a meeting between the T1 staff, production co-ordinator (who also oversees data movement), two management-types once a week**
  - Needs to become more frequent, include support roles
- **Production co-ordinator and manager meet with UK deployment team weekly**



# Conclusions

- **The computing model will soon be fully active**
  - Still need to understand all the implications of Physics Analysis
  - Full engagement of the Tier sites and the regional communities is essential
  - Computing System Commissioning in 2006 is vital.
  - Some issues will only be resolved with real data in 2007-8, so we need to be flexible
  - It is hard, but we need funding agencies to understand running this system is as important as running the SCT/Lar etc